Emergency Medical Services Response Times

Definition: Response time begins with the initial dispatch of an Emergency Medical Services (EMS) unit and measures how long it takes that unit to reach the trauma scene.

Summary

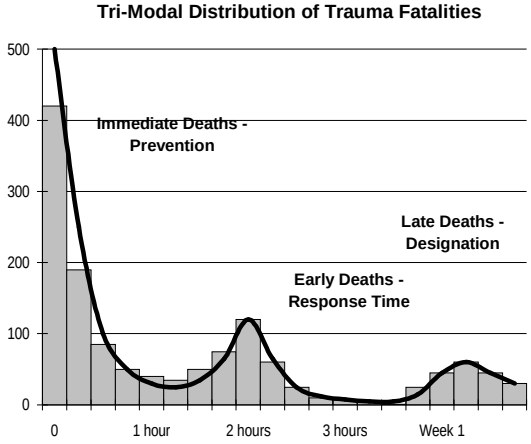
In responding to traumatic injury, the difference between life and death is often a matter of minutes or even seconds. In Washington in 1994 the median response time from dispatch of an Emergency Medical Services (EMS) unit to arrival on the scene was 8 minutes, ranging from 4 minutes in urban areas to 22 minutes in wilderness areas.

Critical Times

Trauma deaths tend to cluster around three distinct times. The first is immediately after the event, and includes people with lacerations of the brain, spinal cord, or heart — injuries which under any circumstances are almost always fatal. Prevention is the only "cure"; about half of all trauma deaths are in this category.

The second peak, early deaths within the first few hours of injury, includes people with severe blood loss from major hemorrhages or from multiple lesser injuries. With the level of medical care available today at designated trauma services, nearly all these deaths are preventable if timely care is provided. It is these cases that are most impacted by EMS response times. Early deaths make up about a third of all trauma deaths

The third peak occurs days after the injury, usually due to organ failure or infection. Nearly all these deaths are also preventable. While time is important, access to the level of care available only at designated trauma services is the factor which most often determines survival.



Year 2000 Goal

Although there is no Year 2000 Goal for EMS maximum response times, the following standards have been adopted into administrative code:

Urban areas	8 minutes
Suburban areas	15 minutes
Rural areas	45 minutes
Wilderness areas	As soon as possible

In addition, a 1996 biennial target is to reduce EMS median response times by 5% from the 1994 figures (below).

Time Trends and Geographic Variation

Statewide collection of EMS data began in 1994. Current data from 23 of the state's 39 counties accounting for 73% of the state's population show the following median response times:

Urban areas	4 minutes
Suburban areas	4 minutes
Rural areas	10 minutes
Wilderness areas	22 minutes
Statewide total	8 minutes

All of these times are well within the current state standards. The median times computed from these data are preliminary and will be updated as more complete data are received.

Groups of Particular Interest

While response times are critical in any trauma incident, they are particularly important and challenging in rural and wilderness areas. Unlike urban and suburban areas where a trauma incident

is usually reported almost immediately, precious minutes often pass before a crash on a rural road is even discovered, let alone reported. Once an EMS unit is dispatched, there can be large distances to the scene, and ultimately to a designated trauma service. The current median response time for rural areas is 10 minutes, compared to 4 minutes for urban and suburban areas.

Time and distance problems in rural and wilderness areas are sometimes exacerbated by the lack of a full-time paid EMS service. Small rural communities often rely on volunteers to respond to trauma incidents and other medical emergencies. Over 65 percent of Washington's certified Emergency Medical Technicians (EMT) are volunteers.

Other Measures

Other Time-Critical Factors. In addition to response time numerous other time measures are recorded and monitored because of their critical effects on patient outcomes. Two such measures are *scene time* and *transport time.*

A general goal for scene times is twenty minutes or less. Many circumstances beyond anyone's control may affect scene times. Two of the more common reasons are patient entrapment and injuries particularly difficult to stabilize. On rare occasions, extended scene times *are* within control of the EMS and Trauma System. Usually, in these cases, the EMT is providing too much care on the scene after the patient has been stabilized. For such cases, education and training can reduce scene time. For 1994 and 1995, the median scene times were 16 minutes.

Transport time is the time from scene departure to arrival at designated trauma center. Many of the factors that affect response time also pertain to transport time. However, transport times area also affected by the availability of designated trauma services. The median transport time in 1994 was 11 minutes; in 1995 it was reduced to 9 minutes.

Once the patient arrives at a designated trauma care center, a whole new set of time measures are monitored and assessed. Among the most critical are surgeon arrival time, time to CT scan, and time to start of surgery.

Outcome Measures. In addition to the many time measurements, there are numerous outcome and system performance measures which are monitored. They include rehabilitation service rates, Advanced Life Support service availability, air transport service availability, operating room return rates, and volunteer EMT retention rates.

Paramount among all these outcome and performance measures is the rate of *unexpected* mortalities.

Unexpected mortalities for trauma patients are identified through an analytical process called TRISS (Trauma and Injury Severity Score). Using key clinical measures, this analysis compares each patient to a national norm and computes the patient's probability of survival. Any patient who dies with probability of survival greater than 50% is considered an "unexpected" mortality.
In 1994, when Washington's trauma system was in it's implementation phase, 53% of the 175 mortalities evaluated by the TRISS methodology were classified as unexpected. For 1995 data received as of January 1996, only 32% of the 176 mortalities analyzed through the TRISS methodology were unexpected.

TRISS Evaluated Mortalities

	All Ages		Age 0-64	
	1994	1995	1994	1995
Deaths	175	176	109	128
Unexpected Deaths	93	57	47	34
% Unexpected	53%	32%	43%	27%

There are, of course, limitations to the TRISS methodology that should be kept in mind when assessing the unexpected mortality rates. For example, no other disease conditions except trauma are entered into the TRISS methodology; so elderly patients, who often have concurrent chronic disease conditions, have predicted rates of survivability which are greater than what is experienced. Yet, even when looking at only the 0-64 year old population, the percent of unexpected mortalities went from 43% in 1994 to 27% in 1995.

Risk and Protective Factors

Ultimately, the mission of any trauma system comes down to this simple maxim: Get the patient to the right care in the right amount of time. Three broad strategies help accomplish this task:

Patient Care Procedures. Patient Care Procedures (PCP) are the pre-established guidelines that answer the basic questions raised in

any medical emergency: Which level of personnel should be dispatched? What types of equipment and vehicles are needed? What types of care should be provided in the field? How will the patient's needs be evaluated? To what level of trauma service should the patient be transported? How will the facility be notified? And so on.

A key component of PCP is the *Trauma Triage and Destination Procedures*, a one-page outline of vital signs, the level of consciousness, anatomy of injury, and biomechanics of injury that is used statewide by all certified emergency medical personnel to determine which level of trauma care service a patient needs.

Designation. The designation of trauma services is fundamental to the development of a trauma system. Typically hospitals are designated as a Level I, II or III trauma service, with Level I being the highest level of trauma care. Hospitals applying for designation must meet a specific set of standards pertaining to staffing, equipment and commitment. Teams of state and national trauma experts review facilities applying for designation to verify their ability to meet these standards.

During the 1993 planning process it was determined that there was a need in Washington for one Level I service, and at least eight Level II services and 21 Level III services. To date, one hospital has been designated as a Level I trauma service, seven as Level II, and 14 as Level III. Most of the gaps in designation are in Pierce, Thurston, Lewis and Grays Harbor counties; efforts are currently underway to bring facilities in those counties on board.

In addition to Levels I, II and III, the Department of Health also developed two more levels of designation, specifically to help address access issues in rural areas. Hospitals or clinics seeking to provide stabilization services until transport to a higher level arrives can thus be designated as a Level IV or V trauma service. A target of thirty-one Level IV services and fourteen Level V services was set during the 1993 planning process. As of January, 1996, 25 hospitals were designated as Level IV and eight hospitals or clinics as Level V.

The special needs of were also recognized with the establishment of designation for pediatric trauma services. Currently one facility is designated as a Level I pediatric trauma service, three are designated as Level II pediatric, and two are designated as Level III pediatric.
In total, 56 hospitals have made a formal, contractual commitment to the state's trauma care system through designation.

Regional Quality Improvement Programs. The highest level designated hospitals within each of the eight EMS and Trauma Regions of the state are responsible for establishing a region wide quality improvement (QI) program. These QI programs function as provider-led forums where state trauma registry data are used to assess and improve trauma care outcomes. It is through the state trauma registry that nearly all key measures of system performance are monitored, including response times, scene times, surgeon arrival time, unexpected surgery return rates, and unexpected mortality rates.

Regional QI programs have strong, statutorily mandated confidentiality protections to help assure frank, thorough discussions. The scope of these QI programs range from assessment of broad trends within a region to specific case review. Membership is defined in statute and includes the designated services' trauma director, trauma surgeon, nurse coordinator, the medical program director, and other leaders in the region's EMS and trauma community.

Intervention Points, Strategies and Effectiveness

Department of Health EMS training and certification procedures have been expressly designed to facilitate volunteerism and accommodate rural communities. There are no fees for certification, and the training curriculum is continually updated and improved based upon input from providers, communities, and medical program directors (the physicians responsible for overseeing EMS care provided within their county).

The legislature has established a new level of EMS certification: Intermediate Life Support (ILS). This new category is similar to Basic Life Support (BLS) certification but allows the Emergency Medical Technician (EMT) to administer some drugs and therapies that had previously required Advanced Life Support (ALS) certification. The small increase in scope of the ILS certification allows the EMT volunteers within rural communities to provide a significantly higher

level of care than their former BLS certification had allowed, without all the additional training and education required for ALS certification.

Rural hospitals and clinics have applied for designation as Level IV and V trauma services. This level of designation creates a focal point within rural communities where trauma patients can be brought for stabilization and transfer to a higher level trauma service.

In addition, the new statewide trauma registry has provided the opportunity to monitor and assess the efficiency and effectiveness of the trauma care system. The establishment of regional quality improvement programs has provided a forum where the system can be evaluated and action plans for improvements can be initiated.

Data Sources

EMS Response Times: Statewide EMS and Trauma Registry System, Office of Emergency Medical and Trauma Prevention, DOH

For More Information

Office of Emergency Medical and Trauma Prevention, DOH 1-800-458-5281

Technical Notes

Median response times were computed for the first EMS unit on the scene of a major trauma incident.